AMENDMENTS TO THE CLAIMS:

Amend the claims as follows:

Claims 1-16. (Cancelled)

17. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein said molecule comprises between 16 and 200 bp~~, more preferably between 24 and 100 bp~~.

18. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein said molecule is a linear or a hairpin nucleic acid molecule.

19. (Currently Amended) The method ~~molecule of~~ claim 18, wherein said molecule is a hairpin nucleic acid molecule and wherein the loop comprises nucleic acid or chemical groups.

20. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein at least one free end is blunt or 5'- or 3'-protruding.

21. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein said molecule inhibits in vitro radiation-enhanced illegitimate exogenous DNA integration.

22. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein said molecule is capable of being up-taken by cell into the cell nucleus.

23. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein said molecule comprises a phosphodiester backbone or a chemically modified phosphodiester backbone, or another backbone with one or several chemical groups.

24. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein said molecule comprises a 2'-deoxynucleotide backbone, and optionally comprises one or several 2'-ribonucleotides or other modified nucleotides or nucleobases other than adenine, cytosine, guanine and thymine.

25. (Currently Amended) The method ~~molecule~~ of claim 23, wherein said backbone comprises methylphosphonates, phosphoramidates, morpholino nucleic acid, 2'-0,4'-C methylene/ethylene bridged locked nucleic acid, peptide nucleic acid (PNA), short chain alkyl, or cycloalkyl intersugar linkages or short chain heteroatomic or heterocyclic intrasugar linkages of variable length.

26. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, comprising one or several chemical groups at the end of each strand or, at least, at the 3' end strand.

27. (Currently Amended) The method ~~molecule~~ of claim 26, comprising one or several phosphorothioates at the end of each strand or, at least, at the 3'end strand.

28. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, further comprising at least one embedded element, which hampers DNA replication, DNA repair, or damage signalling process, said at least one element being incorporated in the centre or at the end of the double-stranded molecule.

29. (Currently Amended) The method ~~molecule~~ of claim 28, comprising

a) a polyethyleneglycol chain, preferably a hexaethyleneglycol chain, or any hydrocarbon chain, optionally interrupted and/or substituted by one or more

heteroatoms e.g., oxygen, sulfur, nitrogen, or heteroatomic or heterocyclic groups, comprising one or several heteroatoms;

b) a unit which is a blocking element as it is not amenable by DNA polymerases or exonucleases, such as any 3'-modified nucleotides,

c) a native oligonucleotide, such as Tn, when used in the loop of an hairpin fragment, preferably a tetradeoxythymidylate (T4).

30. (Currently Amended) The method of claim 32 or claim 33~~molecule of claim 16~~, wherein said molecule is made by chemical synthesis, semi-biosynthesis or biosynthesis.

Claim 31. (Canceled)

32. (Currently Amended) A method of enhancing tumor sensitivity to DNA damaging anticancer therapy, the method comprising administering to a subject a ~~molecule of claim 16~~ nucleic acid molecule, wherein said molecule comprises a double stranded portion of at least 16 bp, has at least one free end, and wherein said molecule is substrate for binding by at least a Ku protein involved in the NHEJ pathway of double strand breaks repair.

33. (Currently Amended) A method of treating cancer, the method comprising administering to a subject a nucleic acid molecule, wherein said molecule comprises a double stranded portion of at least 16 bp, has at least one free end, and wherein said molecule is substrate for binding by at least a Ku protein involved in the NHEJ pathway of double strand breaks repair, ~~molecule of claim 16~~ in combination with a DNA damaging anticancer therapy.

34. (Previously Presented) The method of claim 33, wherein the DNA damaging anticancer therapy is selected from radiotherapy and chemotherapy.

35. (Previously Presented) The method of claim 34, wherein the molecule is administered prior to radiotherapy.

36. (Previously Presented) The method of claim 34, wherein the molecule is administered prior to or along with chemotherapy.

37. (Previously Presented) The method of claim 32, wherein the cancer is selected from glioblastoma, breast cancer and cervical cancer.

38. (Previously Presented) The method of claim 32, wherein the molecule is administered by intravenous, intra-tumoral or sub-cutaneous injection, or by oral route.

Claim 39. (Canceled)